Substitute Specification:

BACKGROUND OF THE INVENTION

Description of the Prior Art and Background:

Patents are important in business strategies as companies look to exploit opportunities to increase revenues. Patent strategies help companies determine what research and development projects to continue funding, with what companies cross-licensing may be advantageous, which technology areas are in need of additional patent protection from competitors, and which technology areas are potentially lucrative. Trademarks and copyrights also offer similar, albeit less protection in the intellectual property arena.

When a company attempts to maximize its investment in R&D, it is important to understand the technologies that its competitors are exploring and developing. There are several internet or web-enabled tools that allow for the search of patents such as the United States Patent and Trademark Office (USPTO) Automated Patent System (APS) and Delphion®'s Intellectual Property Network (IPN). Additionally, as explained on page 110 in the book 'Rembrandts In the Attic' by Kevin Rivette and David Kline, Aurigin's and Delphion®'s tools can allow for the search and analysis of patent information by mapping, clustering, or comparing within hyperbolic trees. This allows a user to understand how a group of patents or claims are related.

As explained by Kevin Rivette and David Kline in their book 'Rembrandts In The Attic' (Page 136), in addition to mapping or clustering patents, it is useful to know the value of the patents. Several valuation schemas exist today. Such schemas include but are not

limited to Aurigin®', www.aurigin.com®, pl-x®, www.pl-x.com®, CHI Research®, www.chiresearch.com, www.technologyreview.com/scorecards/patent_reports.com, Patent Ratings®, www.patentratings.com®, M-Cam®, www.m-cam.com® and Andy Gibb®'s valuation listed on www.patentcafe.com®. One example, included in Aurigin®'s PCT application WO 98/55945, incorporated in this application by reference, provides a method for determining the value of a company's patents by dividing the total revenue from a group of patents by the number of patents in the group. This does not allow for the valuation of another company's patents because revenue dollar information per patent or group of patents is often not available to those outside of the company who may not own the patent rights. An alternative valuation method is used by pl-x®. Pl-x®'s method to valuate patents relies on establishing technology sectors and "pure-play" microcap companies that are within a technology sector. A "pure-play" microcap company has all its value in a single product. The values of these companies within a technology sector provide a reasonable value for the technology itself. Along with other variables, the Black-Sholes Pricing model, and options theory or the discounted cash flow method, pl-x® is able to determine a value for the patent.

When researching a technology, patents are not the only source of information. Scientific publications provide large and valuable quantities of information on new technologies. SciFinder found at www.cas.org® is a web-based search engine for abstracts from many scientific publications. Additionally, trademarks and copyrights can be found within specific government (.org and .gov) websites

Web-based tools provide easy access from various locations; thus, they are a preferred method of searching. It is essential that web-based tools are easy for a user to understand and utilize. Many websites including *Ask Jeeves* at www.ask.com® allow queries using natural or plain English and not Boolean text. This method is simpler and more straightforward for a user as the user may perform queries based on commonly used language.

Researching, searching, and implementing a patent strategy is most effective if a company knows what patents already exist in a technology sector. It is important to know whether the intellectual property and the technology sector more generally is a potential source of revenue for a company, for it is not appropriate to invest money in an already protected intellectual property (patented or otherwise) idea or an idea that is based on old technology. Additionally, patent strategy is enhanced when a company's own patents and those of its competitors can be valued based on non-subjective criteria. A tool that combines valuation techniques with patent mapping and non-patent, scientific information searching capabilities via the web along with a web-enabled Knowledge Management system would provide a method for enhancing a company's ability to develop its patent strategy as well as value its existing intellectual property portfolio.

There are ~~also~~ several available web-enabled and otherwise enabled search systems with large databases and added intelligence that provide solutions to existing technology related problems. One such system, known as the Invention Machine ™, uses revolutionary semantic processing technology to harness the power of linguistic reasoning algorithms to deliver precise solutions to user problems. The technology

developed understands the relationships between words and can extract all key concepts in a document. It automatically builds a high-precision semantic index in a problem-solution format populated by specific and relevant answers to user queries. For example, the user may simply query; "how does one bond a specific type of metal to a specific type of glass? The robust database combined with the KM system quickly and efficiently yields a reply, complete with a referenced bibliography (if one exists), describing and illustrating how this problem has been solved in the past.

Internet-enabled Knowledge Management products also let users in different locations share information and let organizations gather and index important information from sources scattered across the Web. Leading vendors of commercial Knowledge Management (KM) systems include Autonomy®, Business Objects®, Cognos®, Hewlett-Packard®, Hummingbird®, LGA®, and Invention Machine®. Today's KM products use a number of innovative techniques. For example, the underlying technology is evolving beyond simple Boolean searches so that companies can automatically classify information more usefully and employees can find relevant information more reliably. Two technologies illustrating this trend are Autonomy®'s Bayesian probabilistic search-based Activeknowledge® technology and Invention Machine®'s semantic-processing technology.

For example the user may simply query; how does one bond a specific type of metal to a specific type of glass? The robust database combined with the KM system quickly and efficiently yields a reply, complete with a referenced bibliography (if one exists), describing and illustrating how this problem has been solved in the past.

There is a need for a user-friendly, web-based tool that allows a user to input queries in plain-language, search and map patents, while simultaneously valuing those patents. Additionally, there is a need to combine the searching of patents and non-patent, scientific information in one query. There is also a need to access Knowledge Management systems' responses to queries and link those responses to publish, evolving intellectual property databases as well as to their own internal scientific and engineering databases. Finally, there is a need to model the results of the query in such a way that a user may display and/or map (by an audio/visual means in two or three dimensions) solutions to such queries from; patents contained within specific evolving intellectual property databases, technological publications contained within evolving scientific and engineering databases, and evolving Knowledge Management based systems. The end resulting audio/visual display and/or model needs to include the capability to value related and pertinent intellectual property (usually patents, but including trademarks and copyrights), while simultaneously displaying the non-patent technology information.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows the programming logic scheme for SIPS-VSM searching.

Figure 2 shows the overall logic flow for SIPS-VSM.

Figure 3 shows the database search using SIPS-VSM

Figure 4 shows the flow of user defined search.

Figure 5 shows the computer based hierarchy for SIPS-VSM.

Figure 6 shows an example of a modeled map specifying the patent values and associated technology areas.

DETAILED DESCRIPTION OF THE DRAWINGS

Figure 1 describes the programming logic scheme used for developing SIPS-VSM. A user enters the desired query (010) on a client computer in plain language while specifying other options such as which database(s) to use and the format of output desired. The intelligent search engine (100) is a computer software program that resides on the server computer(s). The intelligent search engine will access and retrieve information from the knowledge management database(s) (200), valuation database(s) (300), Intellectual Property (IP) database(s) (400) and technology literature database(s) (400). After information relevant to the query is retrieved from the respective database(s), the data is send to the SIPS-VSM's utilities (500) application which is a computer software program. At least one of these utilities will group IP/Non-IP results per user's specifications. For example, a user may decide to group her/his results according to subject, publication date, assignee, etc. Another utility will value IP while Knowledge management utility enables users to find solutions to problems by semantically analyzing documents by breaking sentences into a noun-verb-adjective tree and then applying such tools as synonym indexes. After SIPS-VSM utilities processes the retrieved data as explained above, the data is processed by the modeling utility (600). The modeling utility will display the results to the user(s) (700), which are of interest as specified by the user, concluding the use of SIPS-VSM.

Figure 2 is the basic process flow utilized by the SIPS-VSM application. The user utilizes a graphical user interface to enter a plain-language query (010) on a client computer connected to the internet. When the search (100) begins, databases are accessed

and searched for information that is relevant to the query through one or more information retrieval procedures. Various databases that contain related information are accessed namely IP database (400) for information related to intellectual property, valuation database (300) for patent valuation, Knowledge Management database (200) for problem solving information and technology literature database (400) for related information from technical publications. Next, the information from these databases is combined, and the information that is irrelevant to the query is filtered out by the SIPS-VISM utilities (500). The relevant information is then formatted and modeled (600) before displaying it on the user computer's display unit using graphical a user interface (700) with or without audio. The visual format may be landscape maps, hyperbolic trees or graphs as per the user's specifications. The audio format (if presented) presents the user with identical information to that presented by the visual display.

Figure 3 describes the searching of the databases. The user enters a query in plain-language (010), and the search engine (100) mines the various databases (200, 300 and 400) for information relevant to the query. The user may limit the search to any combination of the database(s). For example, the user may choose to search only the patent and valuation databases, or the user may choose to search the technology literature, patent, and valuation databases. Also, the user may choose to search only one database or all four databases as shown in figure 3. Alternatively, the user may decide to begin the query by an interrogative phrase requesting a solution to an existing technology dilemma (not shown in figure). This request requires a different starting point for the SIPS-VSM tool and a different initial database to access, but once the relevant

information has been identified and collected, it is displayed to the user according to the user's specifications in an identical manner.

Figure 4 describes how a user may choose to use SIPS-VSM to search for information by specifying different options. Initially, a user enters a plain-language query (010) into the user interface and specifies which database(s) to search. Then the intelligent search engine searches the specified database(s), identifies information relevant to the query and displays results (700) in an audio-visual format. The user may save and/or print the results files generated from the query. Then the user may choose to enter a new query, refine the current search or exit the SIPS-VSM tool. If the user chooses to enter a new query, the user is returned to the beginning of the process as shown in the figure 4. Even if the user chooses to refine the search, a new query will have to be entered and the result(s) of this query will be a subset of the previous result(s). Again, the user may save or print the files created as a result of the refined search. After this the user now again has a choice of either refining the search further, begin a new search or exit the SIPS-VSM tool and thus the cycle continues until the user exits the SIPS-VSM tool.

Figure 5 describes the overview of the network topology incorporating the user and the server computers. SIPS-VSM is an internet-enabled tool. Thus, the user will connect to the server computer via internet. The client computer will use validation procedures to validate the user query before it is securely send across to the server. The server has its own validation and authentication procedures which will prevent unauthenticated access to the server. Commands from the client computer are dispatched to the server which will

trigger the intelligent search engine of the SIPS-VISM. Server administration will allow to access and manage the databases stored on the server computer(s).

Figure 6 is an example of a map generated as a result of a query related to pharmaceuticals. Different patents and scientific information is grouped together based on their co-relation and their values. The information pertaining to patents is retrieved from the IP database, information on scientific publications is obtained from the technical literature database(s). These patents and scientific publications are then valued using the valuation database. Then the final information is filtered and mapped to be presented as an output as illustrated in figure 6. Different colors are assigned to these groups of patents and scientific information based on their values as shown in the figure. Hence, figure 6 serves as an example of one of the forms of output that could be generated as a result of a plain-language user query. Similarly final results could be presented in the form of lists, hyperbolic trees, electronic images of patents and summaries and citations of scientific information as per the options set by the user.

SUMMARY OF THE INVENTION

The present invention is a web-enabled tool that allows for

e) Simultaneous intelligent searching,

f) Problem solving through Knowledge Management systems,

g) Valuation of intellectual property, and

h) Systematic modeling of intellectual property and scientific information through a device such as a graphic user interface.

The invention also allows a user to selectively perform operations related to a-d regarding specific areas of intellectual property within one document or within several related documents.

This invention is based on the need and goal of any research and development organization that is, allowing for valuation of existing and future technology so that resources may be properly directed. In today's global economic environment, R&D expenses are more difficult than ever before to manage due to the high costs associated with employees with proper knowledge skills, laboratories, government regulatory bodies, and the shortened time required to reach developed or developing markets with the resultant product based on these R&D activities.

The present invention merges already developed web-enabled and otherwise enabled computer-based Information Technology (IT) tools so that a user may instantly determine

solutions to technological problems, access all pertinent intellectual property and associated technological publications and optionally value such intellectual property either simultaneously or distinctly. Valuation may be accomplished by a number of methods including, but not limited to, Black-Sholes pricing theory and Discounted Cash Flow models and derivations thereof. In this manner, the invention provides a type of artificial intelligence in both searching and decision making capability. For example, the user may want to know how to make the most efficient fuel cell with the most optimal catalyst, fuel source, and materials of construction. The user would want to determine what patents exist in arriving at that solution, determine what non-patented technological publications are available, review all of this information and extract the pertinent information. The user would also want to instantly value the intellectual property (IP) that exists to determine which avenues of technology are valuable, which areas are available for licensing, which areas have not been protected by intellectual property, etc. Just as important would be to understand which areas have little or no value in today's marketplace and directing resources away from developing technology in that area. This streamlines available resources in a manner that heretofore has been accomplished by lengthy meetings and discussions using subjective means without the use of the more objective-oriented means of the present invention.

In this manner, it is understood that indecision about how to (or even if one should) proceed in the research and development of a certain technology, is removed or at the very least, significantly lessened.

A starting point for this analysis may be to first value known intellectual property and then systematically search all related IP protected and non-IP protected technology. Alternatively, the starting point may be the aforementioned query regarding how to solve a technological problem. Another starting point would allow the user to begin the analysis by accessing known IP protected technology and expanding the search and retrieval methodology from that point.

The present invention allows for a user to determine an arbitrary starting point for the analysis, while allowing for a final audio/visual means to quantitatively analyze each technology (protected or not protected by IP) in terms of specific type, specific quantity, specific terminology, and specific value or any other pertinent and related category contained within various databases. These are the aforementioned databases of patents contained within specific evolving intellectual property, technological publications contained within the evolving scientific and engineering literature, and evolving Knowledge Management based systems.

DETAILED DESCRIPTION OF THE INVENTION

010 – User Query

A user query is a plain-language query regarding an intellectual property such as a patent or non-intellectual property such as scientific information. A user can also specify options regarding which database(s) are to be searched for the query and the format of output desired.

100 - Intelligent Searching

Intelligent searching allows a user to enter a query via a client computer that is connected to a server computer on a global area network. Intelligent searching also provides a user access to the stored intellectual property and scientific information contained in the various databases.

The user utilizes a client computer to access the server. The client computer accesses a server computer, and both are connected on a global area network. The server system accesses the databases containing intellectual property and non-intellectual property scientific information upon receiving appropriate operator commands. The databases are mined for appropriate information that is of interest to the user. The mined information is then returned through the server to the client computer for the user's access.

To begin a search, a user enters a query into an easy to use, web-enabled interface in plain or natural English or other language that does not require the use of Boolean text.

Searches may include but are not limited to keyword, inventor, patent-shoe number, field of search, date of patent, cited reference, current assignee, field of technology, or solutions to scientific or engineering problems.

200 - Knowledge Management (KM) and Problem Solving

Today's KM products use a number of innovative techniques. For example, the underlying technology is evolving beyond simple Boolean searches so that companies can automatically classify information more usefully and employees can find relevant information more reliably. Problem solving techniques allow for inexperienced users to access information that previously only experienced individuals understood or knew.

Users can submit a document in a query form and ask ActiveKnowledge to find other documents on similar topics in databases and on the Internet. Autonomy's technology analyzes the frequency of character strings in documents that it finds to determine which strings address the same topics as the submitted document.

Invention Machine released its first semantic-processing engine, TechOptimizer, in 1995. Several companies, including Intel, have used it to find information that helped them develop new products. The company also uses its technology in new products, Knowledgist and CoBrain, for the individual and the enterprise, respectively. The software semantically analyzes documents by breaking sentences into noun-verb-adjective trees and then applying such tools as synonym indexes.

The present invention and resulting program has the capability to utilize either the Bayesian probalistic search and/or the semantic-processing technology in providing the user with the desired result(s).

300 - Valuation

The program of the present invention may use a modified Black and Sholes Options Pricing model, market variables, options theory, or discounted cash flow to value patents. An example valuation method is the Technology Risk/Reward Unit (TRRU®) method used by pl-x ®(the patent and license exchange). The variables used in the pricing model include the time until the product is ready for launch, the average market value of companies that are in the patent's technology sector, the variance of company valuations in the patent's technology sector, the patent's expiration date, the cost to bring the product to market, and the 30-day government T-bill rate. These variables are inserted into a modified Black and Sholes model to calculate the present value of the patent. The patent's present value is then modified based on the number and exclusivity of the licensing agreements the company plans to offer.

An alternative patent valuation method includes the discounted revenue valuation patented by pl-x®. This method allows a user to value a patent that may not fit into specified technology sectors or drugs that require FDA approval. It requires the input of several variables from schedules that incorporate the breadth of the patent's claims, the potential size of the invention's market, and the regulations that surround the invention's technology.

An additional method, that is similar to the pl-x® discounted revenue valuation method is discounted cash flow (DCF). This is a traditional method of valuing property, including IP. The DCF method relies on a subjective determination of the present value of the property, for example a patent. The patent's value is then determined using DCF analysis which takes into account, among many variables, the life of the patent, interest rates, present value, and inflationary factors.

400 - Patent and Non-Patent Information

Patent and non-patent scientific information, such as journal articles, is stored in databases that are accessed by the SIPS-VSM intelligent search engine. The information retrieved from the patent database is relevant prior art to the user's query. The scientific information contained in the non-patent information databases may include published papers or journal articles. Again, the search engine mines the databases for information that is relevant to the user's query.

500 - SIPS-VSM Utilities

The SIPS-VSM utilities portion of the tool filters and groups all information as well as values the patent information. The filter removes information that is irrelevant to the query, or it includes information that is relevant to the query. The filter operates using an SQL programming language or an alternative programming language. The utilities also value the patent information. The relevant information is grouped according to topic, inventor, value, etc. for modeling. Aurigin Systems Inc. describes grouping of related objects in its PCT/US00/05080 application.

600 - Modeling of Results

The relevant results are modeled for display. This may require information to be ordered, tabulated, or otherwise formatted for each type of visual or audio display specified by the user. Topographical mapping is a method of modeling and is described below. Visual mapping of information in 2-D and 3-D format is demonstrated at www.antarcti.ca®. Adding color-coding may enhance visual maps. A color-coded "Mutual Fund Map" at www.smartmoney.com® is an example of how color is used to distinguish mutual funds based on performance. Hyperbolic trees may also be used to compare Intellectual Property with comparable innovations. The present invention may utilize the same or similar technique to distinguish IP values on a topographical map such as provided by Aurigin's landscape plots or other evolving methods.

700 - Display of Results

Patent and Claim Information

The program allows for simultaneous modeling of the valuation and intellectual property results. The results may be displayed in various graphical formats. Hyperbolic trees allow for the display of information on a hyperbolic plane using a focus plus context technique. The center of the tree is called a root, and the branches of information related to the root are displayed in the hyperbolic plane. The focus is easily shifted to a different part of the hyperbolic tree using a pointer device, such as a mouse, to choose a different root center. The program can be used to map patent citations or a patent's claims in

hyperbolic tree format. A single patent or claim is at the center of the hyperbolic tree and related claims or patents are the branches connected to the root center. The values of the patents may be displayed next to the patent citations. Alternatively, the user may choose to display the values for patents only when the patent is chosen using a pointer device, such as a mouse. An additional option allows the user to define colors to code patents based on the patent's value. For example all patents that have values between $1,000,000 and $5,000,000 may be green while other colors represent different patent value ranges. This method and analysis could also be extended to valuing other forms of intellectual property.

The program also allows for simultaneous modeling of the patent, associated technology areas, and valuation results on a landscape-type map. The landscape map divides a general topic into several subtopics that are represented as a different region on the map. For example the topic of fuel cells may be divided into subtopics of sensor, hydrogen, vehicle, and lithium, and each subtopic is represented in a different area on the map. The landscape map is similar to a topographical map. The height of a subtopic's peak in a landscape map corresponds to the number of patents or claims that fall within the subtopic. When more patents or claims correspond to a single subtopic, the peak in that area is higher. Each patent is represented on the landscape map with a marker. The user can assign colors to the markers to represent the valuation ranges that are displayed on the landscape. For example a user may choose green to define all patents that have values in the range of $1,000,000 and $5,000,000 while other colors may represent different patent value ranges.

Alternatively, the patent and claim information may be displayed in a list or graphical format with values corresponding to the patent listing or the patent listing corresponding to color-coded value ranges by various mapping techniques.

Each of these modeling techniques can be organized by various criteria. The user may define the model by requesting patent technology sector, claim, inventor, or current assignee, while still maintaining the display of the value associated with the patent. The patents may also be organized by calculated value or by any other category the user may desire which is a characteristic available from electronic databases.

Non-Patent, Scientific Information

Non-patent, scientific information such as publications may also be displayed in list, landscape map, or tree format. An abstract or summary of the information contained within the publication allows a user to determine which publications are of interest. The publications can then be accessed for downloading the literature of interest or the specific section of the publication that is pertinent and relative to the search or query.

Electronic Images of Patent and Non-Patent Information

The electronic images of intellectual property and non-protected IP technology literature are available to the user. The user may choose a patent from a list, landscape map, hyperbolic tree, or other visual or audio display and view or hear an electronic version of

the patent or other type of intellectual property. Also, a user may view or hear an electronic version of chosen non-IP protected technology literature.

800 - Presentation of Results

Visual results are optionally displayed in split-screen or full-screen format. The split-screen format allows for simultaneously viewing of multiple windows with results of the inputted query. The windows may include lists, hyperbolic trees, landscape maps, electronic images of patents, and summaries and citations of scientific information. For example, a hyperbolic tree displaying the patent citations with overlaid values for the patents, a landscape map displaying groups of patents with color-coded valuations for the patents, a list or summary of the non-patent information, a list of relevant patents, a list of current assignees or inventors that are named on the patents, an electronic image of a patent, and/or a list of the valuations for the relevant patents may all be displayed. The full-screen format allows for display of one or more of the models, images, or listing techniques.

The visual display of results allows the user to easily manipulate and navigate between split-screen and full-screen formats as well as through the windows themselves.

Audible results may be desirable by the visually impaired or others who prefer to listen rather than view information. Audible results use two-way speech or voice recognition to understand the user as well as present the results of the query to the user. The audio and visual results match identically.